REMARKS/ARGUMENTS

Reconsideration and allowance in view of the foregoing amendment and the following remarks are respectfully requested.

At the outset, it is respectfully submitted that the finality of the Examiner's Official Action was premature. In this regard, claim 5 was amended solely in response to the Examiner's rejection under 35 USC 112, second paragraph, and not in response to the Examiner's prior art rejection. Nevertheless, the Examiner modified the prior art rejection of claims 5 and 7 to further rely on Friese and Yamada and modified the prior art rejection of claim 6 to further rely upon Yamada. It is respectfully submitted that the Examiner's new prior art rejection were not necessitated by the amendment filed January 17, 2006. Therefore, even though it is submitted that the amendments, above, should be entered after final rejection, as reducing issues on appeal, they should be entered in any event because the Action should not have been made final.

Claims 5-7 were rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement. Claim 5 has been revised above to avoid any question of new matter by reciting that, on the basis of the determined thickness of the protective layer, the amount of spray for the protective layer material is controlled for forming a protective layer of a subsequent gas sensor element.

As noted previously, original claim 6 limited the invention of claim 5 to increasing or decreasing the amount of spray, making reference to the thickness of a protective layer formed "directly previously". Clearly, then, as-filed claim 5 was not limited to increasing or decreasing based on a "directly previously" formed protective layer. It is respectfully submitted in this regard that there is nothing that would prevent the information obtained according to the invention from being used to control any subsequently formed protective layer, and there is no requirement (functionally or structurally) that would limit the understanding of the skilled artisan to controlling the immediately following protective layer, although it is agreed that the disclosed example

embodiment refers to this. Even in this connection, however, Page 19, line 20 refers to "in this Example". Thus, this is merely one example of how the inventive concept may be applied.

It is respectfully submitted that by clarifying that claim 5 refers to controlling the formation of a protective layer of a subsequent electrode, the Examiner's new matter concerns have been obviated and claim 5 is clearly consistent with the disclosed example embodiment. Reconsideration and withdrawal of the rejection of claim 5 is solicited.

Claims 5-7 were rejected under 35 USC 103(a) as being unpatentable over "the admitted state of the prior art" in view of JP '214, GB '572, Friese and Yamada. Applicant respectfully traverses this rejection.

In accordance with a feature of the present invention, a difference between each radius T (measured before spraying at a plurality of radius measurement positions along a peripheral circle while rotating the solid electrolyte body along its axis) and each corresponding radius U (measured after spraying) is calculated. An average value of all the differences is calculated. The average value is considered to be a thickness of the protective layer that covers the surface of the electrode provided on the surface of the solid electrolyte body of the gas sensor element.

The method of the present invention can measure the radii of the target body before and after the plasma thermal spraying and eliminate variation in the thickness of the protective layer sprayed on the surface of the body. Accordingly, it is possible to correctly evaluate an actual (average) thickness of the protective layer on the body. The method of the present invention can eliminate variation in the profile of the body, uneven surface of the body, and uneven surface of the body after spraying.

The method of the present invention can perform the thickness control with micrometer accuracy since the measured value is used as feedback for controlling the

supplying amount of the spraying material. The supplying amount of the spraying material can be controlled to ± 1% accuracy for a thickness control of 100 micrometer accuracy. However, because the measurement accuracy is within ± 2% accuracy, it is possible to statistically keep the accuracy within ± 2.3% accuracy in consideration of both variations of the accuracy of the supplying amount of the spraying material (molten protective layer material) and the accuracy of measurement.

The references cited by the Examiner disclose methods for measuring the thickness and profile of a target, but do not disclose how to increase the measurement accuracy and do not disclose how to perform feedback control, as in the method of the present invention. Indeed, the references cited by the Examiner do not disclose or suggest the feature of the present invention that the average value of all of the differences between radii U and T measured at corresponding points to each other are used in order to form a (subsequent) protective layer having a desired thickness.

Sonoda JP 2000-282214 discloses a technique in which a distance measuring head 5 measures each distance of a plural points in a thermal spraying base material 6 and 36 (see Fig 7 in JP '214), prior to thermal spraying. A difference between the measured distance and a thickness of a sprayed coating film is calculated after thermal spraying so as to determine a thickness of a thermal spraying material per thermal spraying (one pass). Based on the calculated difference, the number of the sprays (pass number) is determined. Thus, Sonoda discloses a technique to measure a distance to a target point on a surface of a substrate, storing the measured distance to the target point, calculating a difference between a thickness of a sprayed coating film on the surface of the substrate and the measured distance, and controlling the spray process based on the difference calculated. Moreover, Sonoda discloses only determining the number of sprayings (pass number) based on the determined thickness of a single spraying.

Thus, JP '214 (Sonoda) discloses only monitoring the thickness of a coating applied to a particularly component to determine whether the coating has reached an objective value. There is no teaching or suggesting of measuring plural radii before and after spraying on a gas sensor electrode and then using this information to control formation of a subsequent protective layer as opposed to the current protective layer.

GB '562 –Kyriakis discloses measuring a diameter before and after extrusion and mentions that this can be used to feed back control the amount of plastic material extruded on the product. Here again the feed back control appears to be directed to the formation of a single component such as a cable and there is no teaching of measuring the thickness on formed product and using it to control a subsequent protective layer on a subsequent product. Also, this reference does not teach modifying the amount of a spray coating but rather an extruded layer. Additionally, Kyriakis does not teach or suggest the measurement of plural radii as specifically disclosed by applicant.

It is respectfully submitted that the skilled artisan, considering the art cited by the Examiner would not attempt a piecemeal combination thereof but would recognize that their disclosures are directed to distinctly different processes and products. Indeed, the skilled artisan would not be motivated to modify, for example, Sonoda in view of Kyriakis because Sonoda already uses feedback control by, monitoring whether the goal thickness has been achieved and applies more coating if it is not. Thus, Kyriakis adds nothing to Sonoda in respect to Sonoda's invention and certainly does not teach or suggest the modification thereof so as to produce the invention claimed.

Moreover, even if the cited prior art could have been combined, their combined teachings do not each or suggest the combined concept of determining an average difference between the respective measured radii at the respective intersection points as claimed and controlling the amount of spray of the protective layer material for a

protective layer of a gas sensor element based on the average of differences between radiuses of the protective layer formed on a previously formed gas sensor element.

Friese discloses a technique in which a transferred layer mass is measured based on a substrate surface temperature measured during a spraying process in order to assume a layer thickness. Friese clearly does not teach the determining or control steps of the invention even if combined with the primary references, which are themselves deficient with respect to the claimed invention for the reasons advanced above.

The Examiner has newly cited Yamada as allegedly teaching the [claimed] method of calculating average thickness. Yamada discloses a conventional method in which the thickness of the sprayed film is determined by measuring the thickness of a sample with a micrometer before and after spraying, effecting this measurement at another four points and calculating the average measurement among those five points (see paragraphs 0160 and 0161 of Yamada). However, Yamada's conventional method, which is widely known, eliminates the fluctuation of thicknesses or measurement error among only five points. In contrast, the present invention calculates the average of differences between plural radiuses of the protective layer (acquired during rotation) of the gas sensor electrode previously manufactured and, further, controls the amount of spray of the protective layer material for a subsequent gas sensor electrode based on the determined thickness of the protective layer of the previously manufactured gas sensor electrode. Thus, the technique of Yamada is different from that of the present invention and does not anticipate nor render obvious the inventive method.

Furthermore, as noted, Yamada specifically refers to measuring the thickness of a sprayed film using a micrometer. However, the remaining art of record, such as Sonoda, clearly teaches against the use of a micrometer. See for example in this regard paragraph 003 of Sonoda which explains that hand measuring with a micrometer may damage a sprayed coating and poses problems in accuracy of measurement and

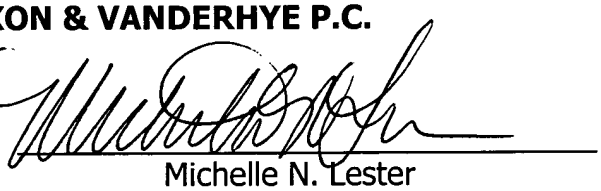
dependability. In any event, Yamada clearly does not teach measuring radii as claimed nor controlling the formation of a subsequent protective layer as claimed.

For all the reasons advanced above, reconsideration and withdrawal of the rejection of record is solicited.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in condition for allowance and an early Notice to that effect is earnestly solicited.

Respectfully submitted,

NIXON & VANDERHYE P.C.

By: 

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